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(11) **Patent Application 26 16 390**

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(54)	Description:	Recovery of biologically nisin-treated powdered milk
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Claim:

Process for recovering biologically nisin-treated powdered milk for animal feed purposes using a milk culture of a nisin-producing *Streptococcus lactis* from flash-pasteurized skim milk, which one inoculates with 2 to 5% of a nisin-producing culture of *Streptococcus lactis*, which produces fermentation within 18 hours, periodically neutralizes with 15 to 20% caustic soda and keeps the pH of the culture between the limits of 6.0 to 6.8 at a temperature of 28 to 33°C, characterized in that, at the end of fermentation, the culture is cooled to 10 to 14°C using the membrane technique with simultaneous stirring with a mechanical agitator, is ultimately condensed to 14 to 25% of the dry weight, and is dried in a flash dryer at an outlet air temperature of 87 to 97°C, and that the recovered nisin-treated powdered milk is cooled to 18 to 20°C with air that has a lowered humidity via pneumatic conveying, before it leaves the cyclone.

The process in accordance with the invention involves the recovery of biologically nisin-treated powdered milk. This powdered milk is intended to replace medicinal antibiotics in milk substitutes and feeds.

A process for producing nisin using a milk culture of a nisin-producing *Streptococcus lactis* from flash-pasteurized milk, which one inoculates with 2 to 5% of a nisin-producing culture of *Streptococcus lactis*, which produces fermentation within 18 hours, periodically neutralizes with 15 to 20% caustic soda and keeps the pH of the culture between the limits of 6.0 and 6.8 at a temperature of 28 to 33°C, is known (DT-OS 16 17 580 and GB-PS 8 44 782).

Due to the low antibiotic content (5000 U/g), a preparation obtained in such a manner cannot be used in milk substitutes having a lowered content of milk solids, because it does not meet the daily requirement of nisin for calves, young steers, other animals and poultry which are fed with said preparation.

The purpose of the invention is to make available a process for recovering biologically nisin-treated powdered milk having an increased nisin content.

This purpose is realized with the process indicated in the claim.

The biologically nisin-treated powdered milk recovered in this manner for feed purposes contains over 20,000 U/g, i.e. at least four times as much as the preparation of the prior art.

In feed experiments, three groups of calves were fed 20 portions each. The first control group was fed with a milk substitute having an equivalent content of chlortetracycline. The second group received  $0.9 \times 10^6$  U nisin daily, and the third group  $1.8 \times 10^6$  U in nisin-containing powdered milk. Compared to the first control group, the groups of calves that received nisin in their feed exhibited a lower consumption of feed and a greater weight gain of about 5.3 and 8.9 kg, respectively.

In feed experiments with two groups of piglets (6 litters each) that were fed with feed without antibiotics (group 1) and with feed containing 40,000 U/kg nisin, a lower consumption of feed and a higher daily weight gain of 41 g was established compared to the control group.

Biologically nisin-treated powdered milk containing about 20,000 U/g, which was fed to young animals and poultry, resulted in a 10% greater weight gain compared to a feed without antibiotics or with e.g. oxytetracycline.

The invention is elucidated hereafter by means of an example.

#### Example

110 kg flash-pasteurized skim milk are inoculated with 2 to 5% of a culture of nisin-producing *Streptococcus lactis* and subjected to fermentation for 18 hours. The pH of the culture is kept between the limits of 6.0 and 6.8, the periodic neutralizing with 15 to 25% caustic soda being carried out at a temperature of 28 to 33°C. At the end of fermentation, the temperature of the culture is lowered to 10 to 14°C using the membrane technique, i.e. via heat exchangers, with simultaneous stirring with a mechanical agitator. Inoculum content and temperature are each determined according to milk quality and room temperature. The culture is condensed in a

vacuum evaporator to 18 to 20% of the dry weight. The concentrate is dried in a flash dryer at an outlet air temperature of 87 to 97°C. The recovered product is cooled to a temperature of 18°C by means of air having a lowered humidity via pneumatic conveying, before it leaves the cyclone. This process yielded 10 kg biologically nisin-treated powdered milk for feed purposes with a nisin content of at least 20,000 U/g.

The utilization of the invention may be limited by legal regulations, especially by the Foodstuff Act.